

# CONIFERS OF THE BEAR LAKE AREA AND MOUNTAINS SOUTH OF THE GREAT SALT LAKE<sup>1</sup>

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As Critchfield and Allenbaugh (1969) have pointed out, much remains to be learned of the distribution of conifers in the Great Basin region. The same is true of many other areas elsewhere in the West. Current research at Utah State University is designed to provide new distribution data through systematic surveys of areas that have received little attention from botanists and foresters.

Typical of such areas are the contiguous parts of Utah, Idaho, and Wyoming that comprise the Bear Lake Plateau and the Bear River Divide; and the complex of mountains immediately south of the Great Salt Lake.

This report deals with the conifer flora of those areas. The occurrence of previously unrecorded species is supported by specimens deposited in the Intermountain Herbarium at Utah State University, Logan, Utah (UTC), though individual collections are not cited in the text.

## THE BEAR LAKE PLATEAU

This plateau lies immediately to the east of Bear Lake. It is bounded on the east and north by the meandering Bear River which is paralleled by the Union Pacific tracks and by U.S. Highway 30N from Sage, Wyo., to Alton, Idaho. Its southern boundary is considered here to be Utah Highway 16 from Laketown to Sage Creek Junction. It comprises an area of approximately 240 square miles, including portions of Rich County, Utah; Bear Lake County, Idaho; and Lincoln County, Wyo.

The plateau rises sharply above Bear Lake (elevation 5924 ft) to elevations of 7500-7800 ft within a mile of the shoreline. The plateau is dissected on the west side by several short steep canyons draining into Bear Lake. The east slope is drained by a series of intermittent streams.

The steep west-facing slope is dotted with Utah juniper (*Juniperus osteosperma* [Torr.] Little) scattered on rocky ground covered largely by sagebrush and grass. In the smaller ravines where a northerly aspect affords shelter, the juniper is associated with Rocky Mountain maple (*Acer glabrum* Torr.), serviceberry (*Amelanchier* sp.), mountain mahogany (*Cercocarpus ledifolius* Nutt.) and chokecherry (*Prunus virginiana* L.).

In South Eden Canyon narrow-leaved cottonwood (*Populus angustifolia* James) and aspen (*P. tremuloides* Michx.) occur in the stream bottom; clones of aspen are also common in sheltered draws

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to over 7000 ft. Utah juniper is the only conifer in South Eden Canyon except for two subalpine firs (*Abies lasiocarpa* [Hook.] Nutt.). These trees were growing 0.8 mile apart at about 6600 ft in moist draws on the north-facing slope of the canyon. They probably grew from windborne seed originating in the Bear River Range across Bear Lake, at least 10 miles to the west.

The top of the plateau is treeless except for scattered aspen trees. On north-facing slopes are scattered Utah junipers, and about 3 miles south of Pegram, Idaho, an isolated all-aged stand of Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco). This stand is on a north-facing slope and extends from about 6150 to 6600 ft. Cone-bearing is heavy in this stand. Despite its isolation, many of the trees show prominent signs of porcupine injury.

In North Eden Canyon, and in a nameless canyon about 7 miles to the north, mixed stands of Rocky Mountain juniper (*J. scopulorum* Sarg.) and Douglas-fir occur on north-facing slopes between 6000 and 6500 ft. Some of the associated angiosperms, especially in the stream bottoms, are chokecherry, quaking aspen, box elder (*Acer negundo* L.), mountain mahogany, and willows (*Salix* spp.).

#### THE BEAR RIVER DIVIDE

The Bear River Divide lies southeastward of the Bear Lake Plateau. It comprises an area of about 1000 square miles, mostly in Lincoln and Uinta counties, Wyo., with a small part (Crawford Mountains) in Rich County, Utah. It is bounded on the west by the Bear River; on the north from Sage to Kemmerer, Wyo., by U.S. Highway 30N and the Union Pacific tracks along Twin Creek; and on the east and south by U.S. Highway 189 from Kemmerer to Evanston, Wyo.

Most of the divide area consists of high, rolling, sage-covered hills reaching as high as 8242 ft in the north (Elk Mountain) and about 8640 ft in the south (Medicine Butte). The steepest slope is the western scarp of the Crawford Mountains, which rises above the Bear River from about 6200 ft to over 7800 ft east of Randolph, Utah (Rex Peak).

On the west scarp of the Crawford Mountains, Rocky Mountain juniper, Utah juniper, and Douglas-fir are found on north-facing slopes from about 6600 ft to 7800 ft. In some of the steep box canyons below Rex Peak, both pinyon (*Pinus edulis* Engelm.) and singleleaf pinyon (*P. monophylla* Torr. and Frém.) are found in association with Rocky Mountain and Utah junipers, Douglas-fir, and mountain mahogany. This is the most northerly stand of pinyon yet reported (Critchfield and Little, 1966). It consists of trees of all ages, including seedlings, between 6800 and 7700 ft. Most of the trees appear to be pure pinyon, but many show evidence of hybridization with singleleaf pinyon. A detailed treatment of this and other stands of hybridizing pinyon pines is now in preparation.

Thickets of aspen and chokecherry are found on the exposed ridge tops around Rex Peak. Scattered aspen clones, chokecherry,

and mountain mahogany form the only tree cover over large areas in the interior of the divide, especially on Elk Mountain and in shallow ravines, as on Medicine Butte.

Just outside the eastern boundary of the area, Douglas-fir is found on Oyster Ridge east of Albert Creek. On steep rocky slopes south of Elkol, Wyo. (about 7 miles SW of Kemmerer), limber pine (*P. flexilis* James) is found with Rocky Mountain juniper.

Douglas-fir and limber pine also occur on north-facing slopes from Kemmerer west to Nugget between 6800 ft and 7400 ft.

Just north of the divide area in Schuster Basin (about 6 miles N of Fossil Station), Engelmann spruce (*Picea engelmannii* Parry) is found along streams. On the slopes above are found Douglas-fir, limber pine, and Rocky Mountain juniper associated with aspen.

#### STANSBURY ISLAND

Stansbury Island is connected to the south shore of Great Salt Lake by a causeway across the salt flats. It consists of a single range of steep rocky hills rising to a maximum elevation of 6645 ft. The only conifer species found on the island was Utah juniper (*Juniperus osteosperma* [Torr.] Little), which occurs from the edge of the salt flats (ca. 4300 ft) to over 6600 ft.

#### THE STANSBURY MOUNTAINS

The Stansbury Mountains are typical of Great Basin ranges. They extend south from Timpie for about 30 miles to Johnson Pass (Utah Highway 215). They are oriented north-south and rise abruptly from the desert floor on either side. To the east lie Tooele Valley and Rush Valley with elevations ranging from 4500 to 5500 ft. To the west is Skull Valley where elevations range from 4200 to 4800 ft. The highest point in the range is Deseret Peak (11,031 ft); several other peaks exceed 10,000 ft. Most of this area is in the Wasatch National Forest.

The dry west-facing slope is thinly forested with scattered Utah junipers. In Dry Canyon, which extends east of the Skull Valley Indian Reservation, this juniper is associated with singleleaf pinyon from 6100 to 7100 ft. The singleleaf pinyons are mainly restricted to north-facing slopes and the canyon bottom. Near their upper altitudinal limits they are associated with limber pine and white fir *Abies concolor* (Gord. and Glend.). According to local residents, singleleaf pinyons occur in other canyons on the west side of the range; and in a small canyon just south of South Willow Canyon (on the east side) as well.

Forest cover is much heavier on the east side of the range, especially in the canyon bottoms and on north-facing slopes where Douglas-fir predominates.

The most luxurious vegetation is found in South Willow Canyon, and includes, at about 6000 ft, Utah juniper, narrow-leaved cottonwood, chokecherry, bigtooth maple (*Acer grandidentatum* Nutt.),

Douglas-fir, box elder, and aspen. At about 6500 ft white fir becomes common in stream courses, and there are occasional limber pines and Rocky Mountain junipers.

At comparable elevations in the Mining Fork of South Willow Canyon and in North Willow Canyon, most of the same species are present.

Below the Lower Narrows of South Willow Creek, on a brushy north-facing slope above a Boy Scout camp, were about a score of living and dead ponderosa pines (*P. ponderosa* Laws.) and two lodgepole pines (*P. contorta* Dougl.). These pines ranged in age to about 28 years and most had been injured or killed by porcupines. No seed trees were found that might have been the progenitors of these saplings, despite a careful search of the mountainside and surrounding area. The nearest known natural stands of both species lie at least 50 miles distant in the Wasatch Range (Critchfield and Little, 1966), and it is probable that these trees were planted.

Further up South Willow Canyon the predominating species is Douglas-fir. White fir is common in moist streamside habitats. Between 7600 and 8000 ft, along the trail to Deseret Peak, limber pine, subalpine fir, Engelmann spruce, and Rocky Mountain juniper are associated with white fir, Douglas-fir, and aspen. Engelmann spruce becomes the dominant species in the upper reaches of Mill Fork.

Above 10,000 ft there is frequent *krummholz* of Engelmann spruce, limber pine, subalpine fir, and even Douglas-fir, with occasional mats of prostrate *Juniperus communis* L. The summit of Deseret Peak is treeless.

On the north sides of high ridges extending west from Deseret Peak are further stands of Engelmann spruce. At its lower limits this forest merges into mixed stands similar to those in upper South Willow Canyon; and this forest merges into the drier west-slope type described above.

Along the south edge of the Stansbury Mountains the relatively low dry hills are covered by extensive stands of Utah juniper. In the bottom of Clover Creek (in Johnson Pass) are box elders, narrow-leaved cottonwoods, and aspen.

#### THE ONAQUI MOUNTAINS

This range extends from Johnson Pass southward for about 15 miles to Lookout Pass, through which runs the old Pony Express Route. Its highest point is a nameless peak that reaches 9067 ft. These mountains are nearly treeless, the arboreal vegetation being confined to north-facing slopes of canyons and beds of the intermittent streams. The only conifer species identified, by telescopic examination, was Douglas-fir.

#### THE SHEEPROCK MOUNTAINS

The Sheeprocks curve southeastward from Lookout Pass and extend for about 20 miles to Sabie Mountain (8016 ft) and the heads

of Vernon and Cherry Creeks. Beyond Cherry Creek rise the West Tintic Mountains.

The major part of the Sheeprocks lies within the Vernon Division of the Wasatch National Forest. Its highest points are a nameless peak (9273 ft) and Dutch Peak (9154 ft). Large areas are treeless, except for Utah juniper, even on the highest points. In Harker Canyon at 6200 ft, Utah juniper was collected; and at 7300 ft, Douglas-fir and aspen were found on north-facing slopes. Singleleaf pinyon was collected at 6200 ft in Bennion Creek, where it was associated with Utah juniper.

#### THE WEST TINTICS AND BOULTER MOUNTAINS

The West Tintics are a poorly differentiated range of hills lying east of the Sheeprocks and oriented roughly in a north-south direction. Their northward extension is known as the Boulter Mountains or East Tintics. From Lofgreen south into Juab County are extensive stands of singleleaf pinyon and, less commonly, scattered individuals of pinyon. Examination of this stand and others nearby has disclosed what appears to be a hybrid swarm of these two pine species, including putative  $F_1$  hybrids and backcross and introgressant segregates. Evidence of hybridization was also noted on the west slope of the Boulter Mountains (Scranton and Blackrock canyons) and on the east slope (Barlow and Broad canyons), though to a lesser degree. This situation is similar to that in Rich County and to other hybrid pinyon zones extending in a belt from Cache County into Arizona. In an earlier study, Cole<sup>3</sup> reported on a hybrid pinyon population on nearby Sabie Mountain in the Sheeprocks. The hybrid stands mentioned here, and evidence of intergradation in areas inhabited by either pinyon species, will be reported upon in detail elsewhere.

At the upper limit of its distribution in Blackrock Canyon, at about 7500 ft, singleleaf pinyon is associated with chokecherry, subalpine fir, Douglas-fir, and Rocky Mountain juniper.

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